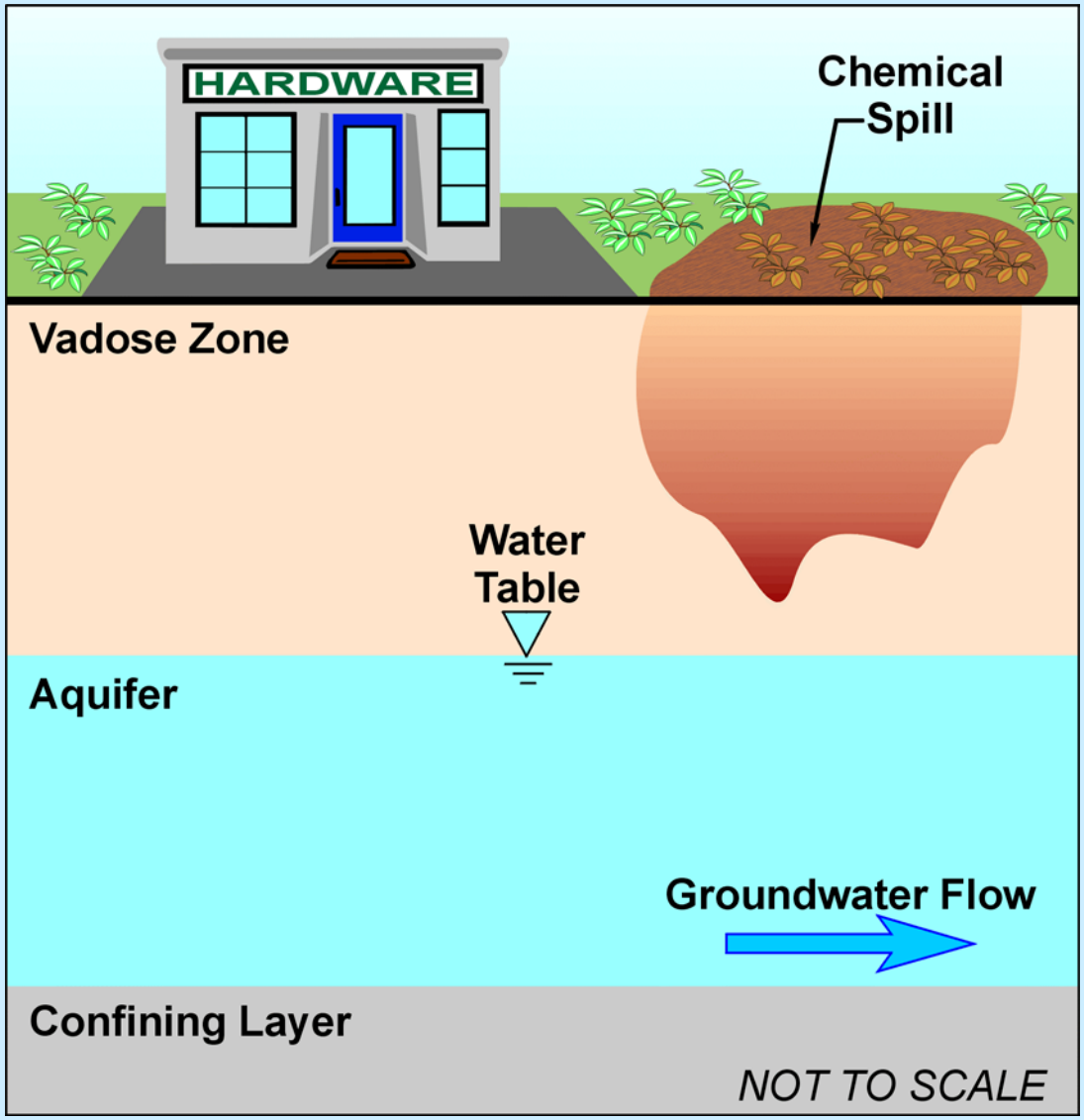
Phytoremediation
Example 1: Soil Remediation (Gasoline)



Contaminated Media:
Localized Soil Contamination

Contaminant Types:
Gasoline

Days Below Freezing:
0

Annual Rainfall:
36 in.

Project Life:
10 yrs

Depth to Soil Contamination:
2-12 ft bgs

Phytoremediation
Example 1 Output

Soil Wizard

Phytoremediation Site Applicability Report - Soil

Your selections:

Contaminant Types
Water Soluble VOCs: No
Water Insoluble VOCs: Yes
SVOCs: No
Metals: No
NAPL Present: No

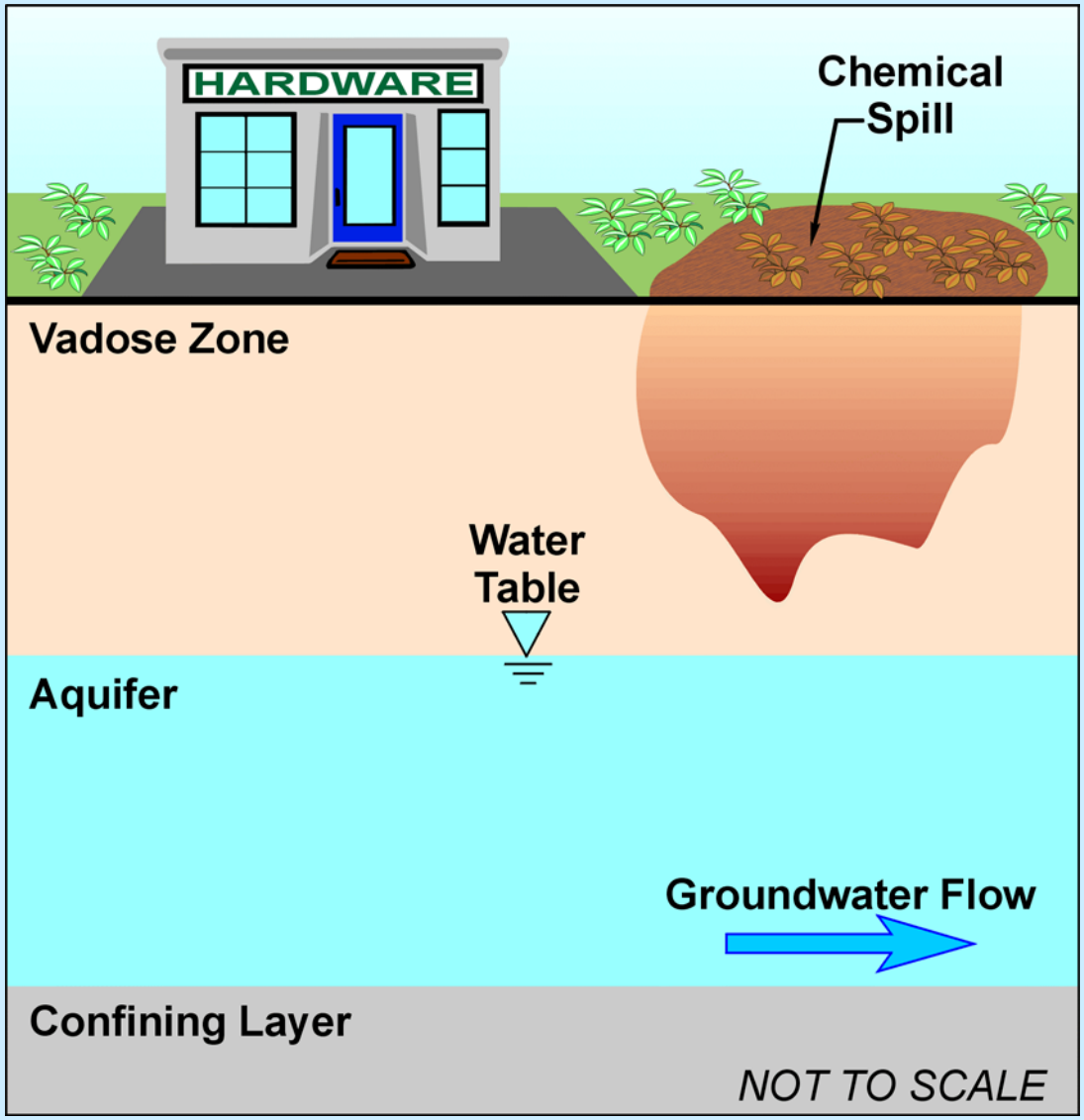
Site Conditions
Minimum Temperature Below Freezing: <200 days/yr
Annual Fainfall:>10 inches
Cleanup Time:>3 years
Depth to Contamination: Between 3 ft and 20 ft
Contaminants Present at Phytotoxic Concentrations: Yes
Hotspot Treatment Possible: Yes

Recommendation:

Based on the information provided, phytoremediation may be effective for **contaminant cleanup**. If applicable, considerations are provided below.

- Areas with phytotoxic concentrations should be removed and treated ex situ or treated in situ by a different method.
- Consider using deep-rooted trees, grass, or legumes with high evapotranspiration rates to remediate organics by rhizosphere remediation or phytoextraction. The organics will undergo some degradation so the toxicity of potential degradation by-products should be considered.
- Water insoluble VOCs (e.g., octanol-water partitioning coefficient >1.0 and <3.5) tend to be taken up by the plant and degraded, incorporated into plant structures, and/or transpired. Plants to consider include phreatophyte trees (e.g., poplar, willow, cottonwood, or aspen); grasses (e.g., rye, bermuda, or fescue); or legumes (e.g., clover, alfalfa, or cowpeas)

Phytoremediation
Example 2: Soil Remediation (SVOCs)



Contaminated Media:
Localized Soil Contamination

Contaminant Types:
SVOCs

Days Below Freezing:
100

Annual Rainfall:
6 in.

Project Life:
10 yrs

Depth to Soil Contamination:
1 to 3 ft bgs

Phytoremediation
Example 2 Output

Soil Wizard

Phytoremediation Site Applicability Report - Soil

Your selections:

Contaminant Types

Water Soluble VOCs: No
Water Insoluble VOCs: No
SVOCs: Yes
Metals: No
NAPL Present: No

Site Conditions

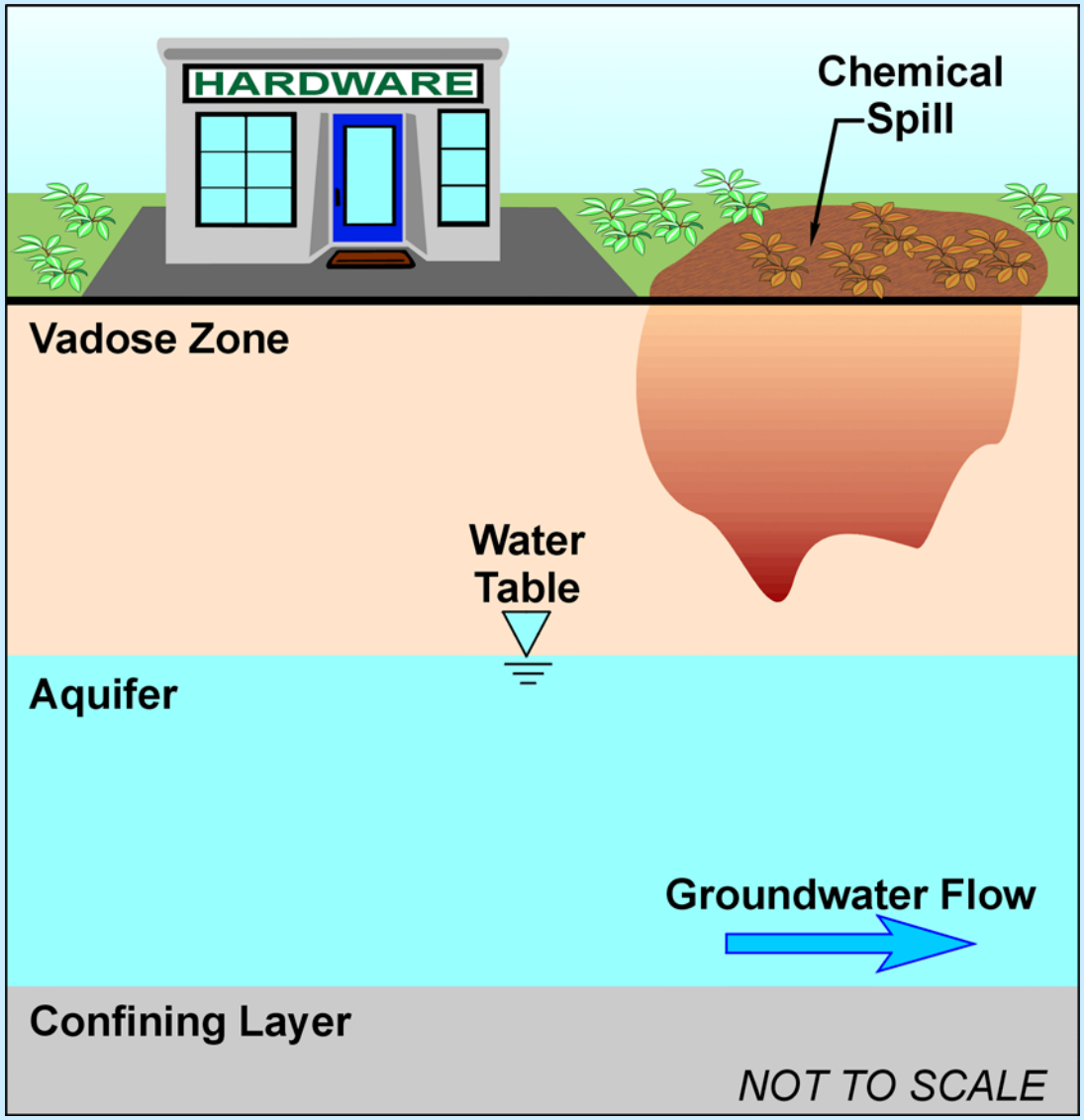
Minimum Temperature Below Freezing: <200 days/yr
Annual Fainfall:>10 inches
Cleanup Time:>3 years
Depth to Contamination: < 3 ft
Contaminants Present at Phytotoxic Concentrations: No
Hotspot Treatment Possible: No

Recommendation:

Based on the information provided, phytoremediation may be effective for **contaminant cleanup**. If applicable, considerations are provided below.

- Consider using deep-rooted trees, grass, or legumes with high evapotranspiration rates to remediate organics by rhizosphere remediation or phytoextraction. The organics will undergo some degradation so the toxicity of potential degradation by-products should be considered.
- SVOCs are large, hydrophobic organic molecules. Organics with an octanol-water partitioning coefficient >3.5 tend to be immobilized by sorption in the root area and degraded by plant enzymes or microbial activity. Plants to consider include phenolic releasing trees (e.g., mulberry, apple, or osage orange); grasses (e.g., rye, bermuda, or fescue); or phreatophyte trees (e.g., poplar, willow, cottonwood, or aspen).

Phytoremediation
Example 3: Soil Remediation (Metals)



Contaminated Media:
Localized Soil Contamination

Contaminant Types:
arsenic, cadmium, lead

Days Below Freezing:
165

Annual Rainfall:
20 in.

Project Life:
5 yrs

Depth to Soil Contamination:
0-8 ft bgs

Phytoremediation
Example 3 Output

Soil Wizard

Phytoremediation Site Applicability Report - Soil

Your selections:

Contaminant Types
Water Soluble VOCs: No
Water Insoluble VOCs: No
SVOCs: No
Metals: Yes
NAPL Present: No

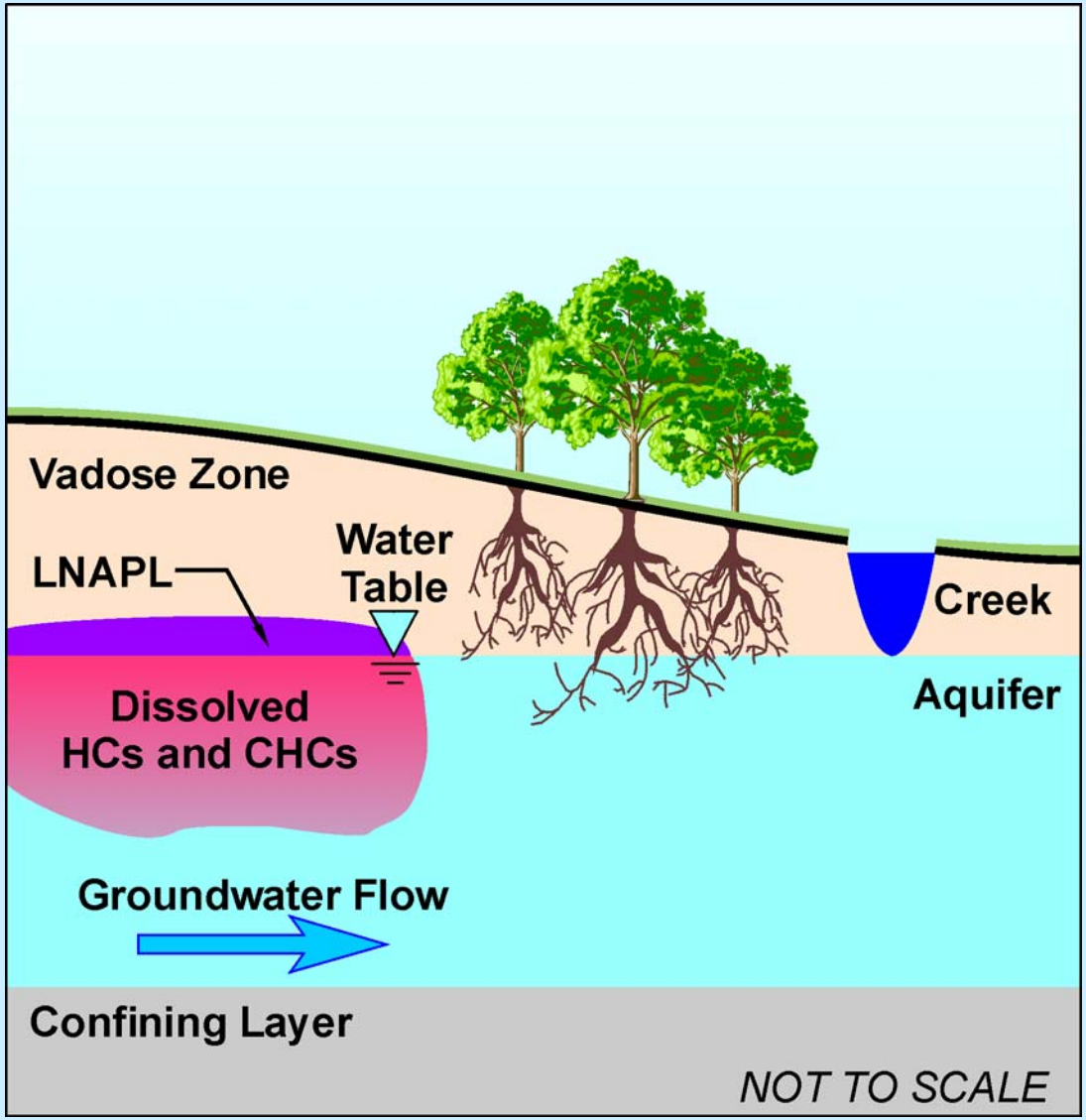
Site Conditions
Minimum Temperature Below Freezing: <200 days/yr
Annual Fainfall:>10 inches
Cleanup Time:>3 years
Depth to Contamination: < 3 ft
Contaminants Present at Phytotoxic Concentrations: No
Hotspot Treatment Possible: No

Recommendation:

Based on the information provided, phytoremediation may be effective for **contaminant cleanup**. If applicable, considerations are provided below.

- Consider using grasses with fibrous root systems to reduce erosion as well as sorb and stabilize metals in situ (e.g., rye, bermuda, or fescue) or plants that uptake and concentrate metals (e.g., indian mustard, sunflowers, rape seed plants). Plants that uptake and concentrate metals may need to be harvested periodically, requiring management of plant waste. Provisions to avoid contact between plants and human or ecological receptors should be considered.

Phytoremediation
Example 4: Groundwater Hydraulic Control



Remedial Approach:
Groundwater Plume Control

Contaminant Types:
Gasoline

Days Below Freezing:
0

Annual Rainfall:
36 in.

Project Life:
10 yrs

Depth to Soil Contamination:
10 ft bgs

Phytoremediation
Example 4 Output

Groundwater Wizard

Phytoremediation Site Applicability Report - Groundwater

Your selections:
Remedial Approach: Hydraulic Control

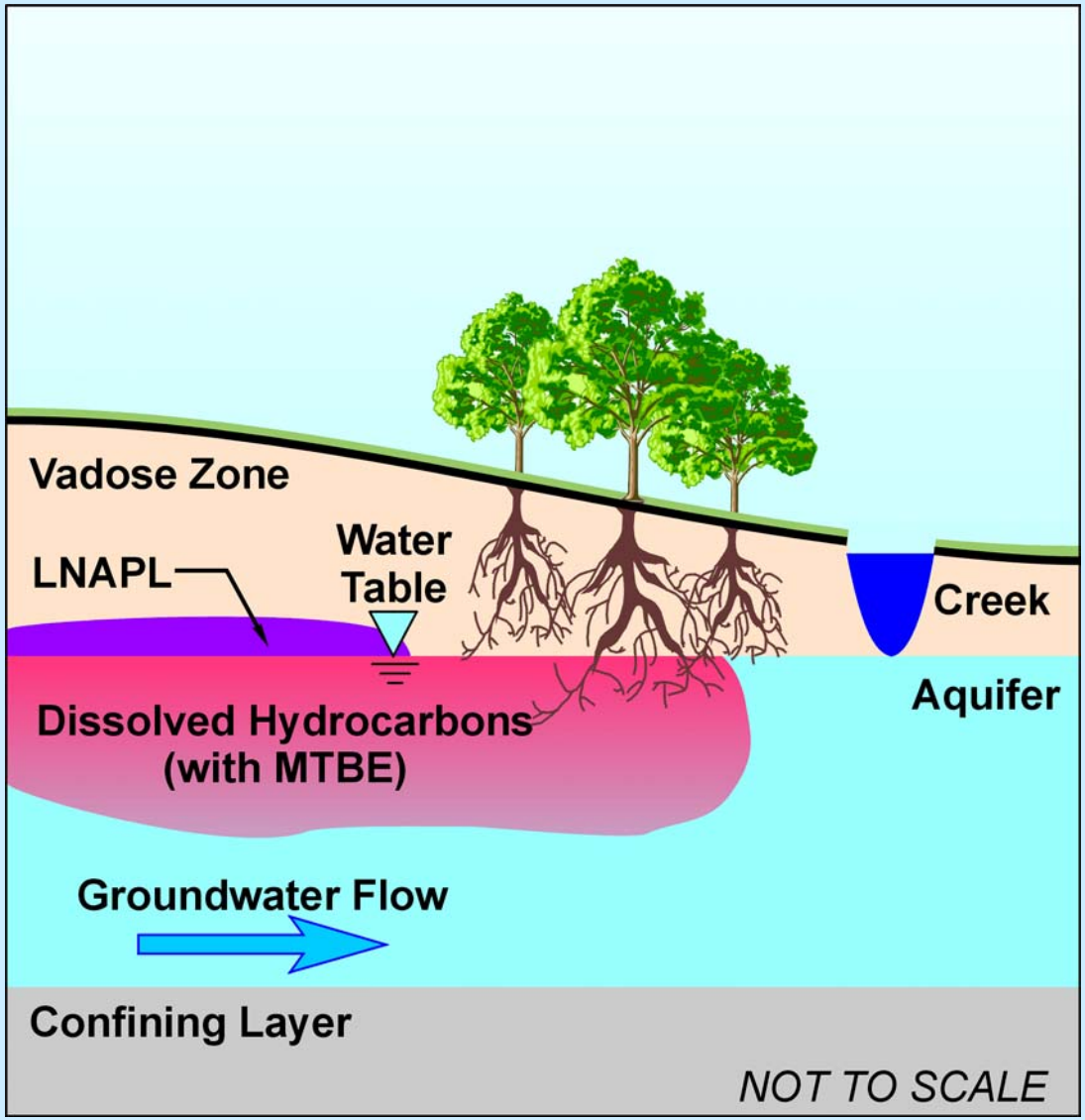
Contaminant Types
Water Soluble VOCs: No
Water Insoluble VOCs: Yes
SVOCs: No
Metals: No
NAPL Present: No

Site Conditions
Minimum Temperature Below Freezing: <200 days/yr
Annual Fainfall: >10 inches
Cleanup Time: >3 years
Depth to Contamination: Between 3 ft and 20 ft
Contaminants Present at Phytotoxic Concentrations: No

Recommendation:
Based on the information provided, phytoremediation may be effective for **hydraulic control** at this site. If applicable, considerations are provided below.

- Consider using deep-rooted trees with high evapotranspiration rates (e.g., populus species).
- Water insoluble VOCs (e.g., octanol-water partitioning coefficient >1.0 and <3.5) tend to be taken up by the plant and degraded, incorporated into plant structures, and/or transpired. Plants to consider include phreatophyte trees (e.g., poplar, willow, cottonwood, or aspen); grasses (e.g., rye, bermuda, or fescue); or legumes (e.g., clover, alfalfa, or cowpeas)

Phytoremediation
Example 5: Groundwater Remediation (Gasoline)



Remedial Approach:
Groundwater Remediation

Contaminant Types:
Gasoline with MTBE

Days Below Freezing:
90

Annual Rainfall:
24 in.

Project Life:
10 yrs

Depth to Soil Contamination:
12 ft bgs

Phytoremediation
Example 5 Output

Groundwater Wizard

Phytoremediation Site Applicability Report - Groundwater

Your selections:
Remedial Approach: Contaminant Cleanup

Contaminant Types
Water Soluble VOCs: Yes
Water Insoluble VOCs: Yes
SVOCs: No
Metals: No
NAPL Present: No

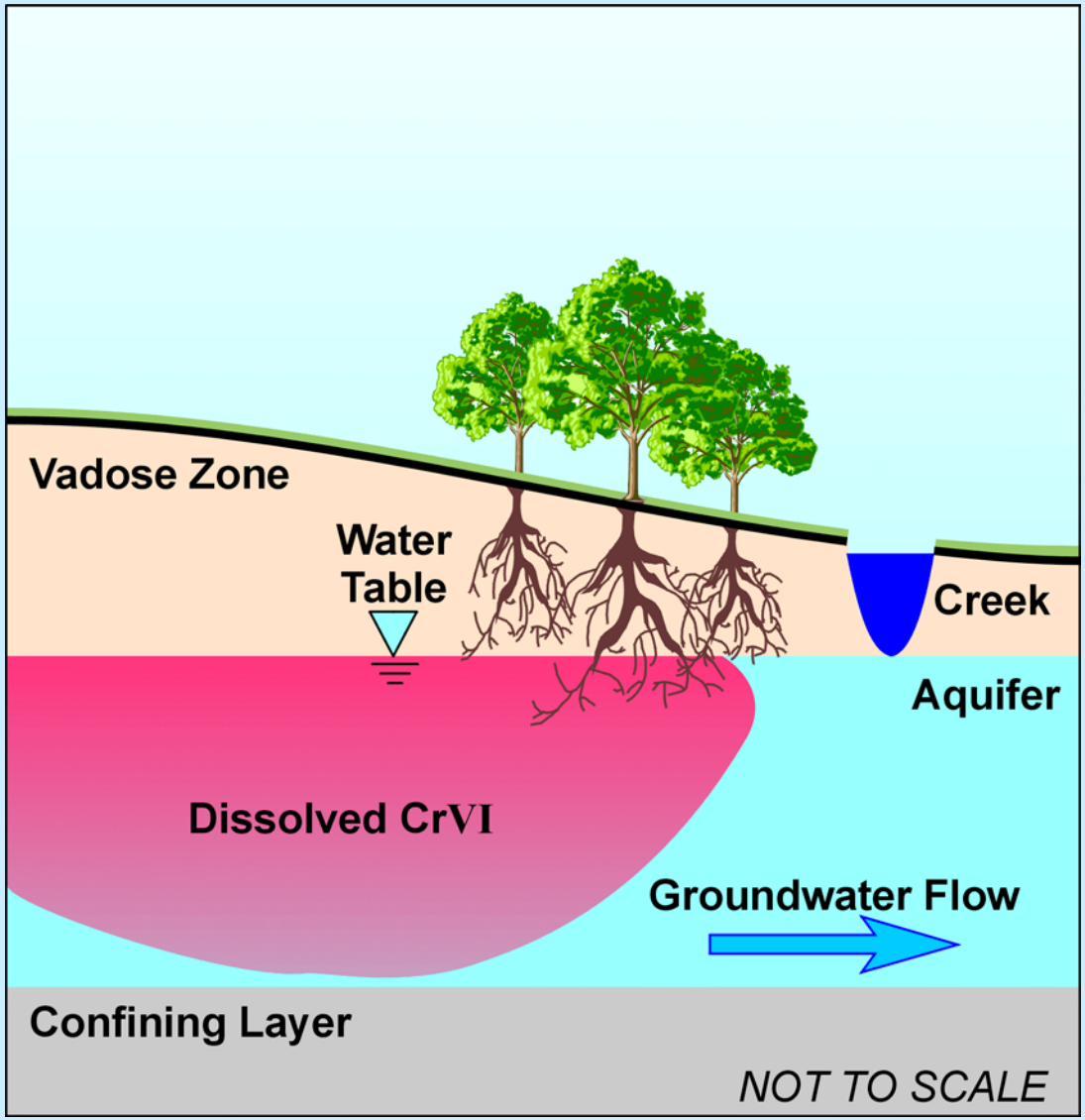
Site Conditions
Minimum Temperature Below Freezing: <200 days/yr
Annual Fainfall: >10 inches
Cleanup Time: >3 years
Depth to Contamination: Between 3 ft and 20 ft
Contaminants Present at Phytotoxic Concentrations: No

Recommendation:

Based on the information provided, phytoremediation is unlikely to be effective for **contaminant cleanup**:

- *Water Soluble VOCs* - Water soluble VOCs (e.g., octanol-water partitioning coefficient less than 1.0) typically are not sorbed and degraded or immobilized by the plant roots or taken up and degraded or transpired by the plant. As a result, phytoremediation typically is ineffective for these contaminants.

Phytoremediation
Example 6: Groundwater Remediation (Metals)



Remedial Approach:
Groundwater Remediation

Contaminant Types:
Cr VI

Days Below Freezing:
125

Annual Rainfall:
30 in.

Project Life:
10 yrs

Depth to Soil Contamination:
18 ft bgs

Phytoremediation
Example 6 Output

Groundwater Wizard

Phytoremediation Site Applicability Report - Groundwater

Your selections:
Remedial Approach: Contaminant Cleanup

Contaminant Types
Water Soluble VOCs: No
Water Insoluble VOCs: No
SVOCs: No
Metals: Yes
NAPL Present: No

Site Conditions
Minimum Temperature Below Freezing: <200 days/yr
Annual Fainfall: >10 inches
Cleanup Time: >3 years
Depth to Contamination: Between 3 ft and 20 ft
Contaminants Present at Phytotoxic Concentrations: No

Recommendation:

Based on the information provided, phytoremediation may be effective for **contaminant cleanup**. If applicable, considerations are provided below.

- Consider using deep rooted trees with high evapotranspiration rates (e.g., populus species) to remediate metals by phytostabilization.